IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Before the Board of Patent Appeals and Interferences

In re the Application

Inventor	:	MOHINDRA
Application No.	:	10/780,471
Filed	:	02/17/2004
For	:	HIGH DYNAMIC RANGE LOW RIPPLE RSSI FOR ZERO-IF OR LOW-IF RECEIVERS

APPEAL BRIEF

On Appeal from Group Art Unit 2617

Date: 2/14/2008

By: Michael Ure
Attorney for Applicant
Registration No. 33,089

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I. REAL PARTY IN INTEREST

The real party in interest is NXP B.V., the successor in interest to the present assignee of record of the present application, Koninklijke Philips Electronics N.V., and not the party named in the above caption.

II. RELATED APPEALS AND INTERFERENCES

With regard to identifying by number and filing date all other appeals or interferences known to Appellant which will directly effect or be directly affected by or have a bearing on the Board's decision in this appeal, Appellant is not aware of any such appeals or interferences.

III. STATUS OF CLAIMS

Claims 1, 4-7 and 10-26 are pending, all of which stand finally rejected and form the subject matter of the present appeal. Claims 2, 3, 8 and 9 have been canceled.

IV. STATUS OF AMENDMENTS

All amendments have been entered. No amendment after final rejection has been submitted.

V. SUMMARY of the CLAIMED SUBJECT MATTER

The present invention relates to a received signal strength indicator for a radio receiver that is simple and that exhibits low ripple and high dynamic range. Typical prior art solutions have had drawbacks in one or more of the foregoing respects. In accordance

with one principal embodiment, illustrated in Figure 2, the received in-phase (RX_I) and quadrature (RX_Q) signals are processed logarithmically by (multi-stage) limiter and summer blocks 30 and 31, respectively. Absolute values of the respective output signals are formed (32, 33) and the resulting absolute values are summed (34) to produce and RSSI signal. In another principal embodiment, illustrated in Figure 3, logarithmic processing is delayed until after the sum of the I and Q signals has been formed.

Claims 1, 7 and 13 relate more particularly to the second principal embodiment. Claim 1 claims a method of forming an RSSI signal; claim 7 claims a radio device having an RSSI device formed in accordance with the second principal embodiment; and claim 13 claims the RSSI device formed in accordance with the second principal embodiment.

Claims 15, 20 and 25 relate more particularly to the first principal embodiment. Claim 15 claims a method of forming an RSSI signal; claim 20 claims a radio device having an RSSI device formed in accordance with the first principal embodiment; and claim 25 claims the RSSI device formed in accordance with the first principal embodiment.

The following analysis of independent claim 1 is presented for convenience:

Element	Figure(s)	Paragraph(s) and/or page(s)
1. A method of determining a received signal strength indicator signal from an in-phase signal component and a quadrature signal component of a low intermediate frequency signal that represents a received radio frequency signal, said method comprising:		
determining a first absolute	Fig. 3, 40	Page 6, final paragraph

value from said in-phase signal component;		
determining a second absolute value from said quadrature signal component; and	Fig. 3, 41	Page 6, final paragraph
forming a sum of said first and second absolute values,	Fig. 3, 42	Page 6, final paragraph
wherein the in-phase signal component and the quadrature signal component contribute to the sum in equal proportion.	Fig. 3	The sum 42 is a "straight sum;" i.e., there is no different weighting of the values being summed.

The following analysis of independent claim 7 is presented for convenience:

Element	Figure(s)	Paragraph(s) and/or page(s)
7. A radio device comprising:		
an antenna for receiving a radio frequency signal;	Fig. 1: 9	Page 5, lines 12 and 13
a quadrature down converter for producing a low intermediate frequency in-phase signal component and a low intermediate frequency quadrature signal component from said radio frequency signal;	Fig. 1: 11, 12	Page 5, lines 15-30
a received signal strength indicator for producing a received signal strength indicator signal from said low intermediate frequency in-phase and quadrature signal components, said received signal strength indicator comprising	Fig. 1: 20	Page 5, line 30 to page 6, line 4
a first absolute value former for deriving a first absolute signal from said in-phase signal component,	Fig. 3, 40	Page 6, final paragraph
a second absolute value	Fig. 3, 41	Page 6, final paragraph

former for deriving a second absolute signal from said quadrature signal component, and		
an adder for forming a sum of said first and second absolute signals,	Fig. 3, 42	Page 6, final paragraph
wherein the in-phase signal component and the quadrature signal component contribute to the sum in equal proportion.	Fig. 3	The sum 42 is a "straight sum;" i.e., there is no different weighting of the values being summed.

The following analysis of independent claim 13 is presented for convenience:

Element	Figure(s)	Paragraph(s) and/or page(s)
13. A received signal strength indicator for use in radio device with an antenna for receiving a radio frequency signal, a quadrature down converter for producing a low intermediate frequency in-phase signal component and a low intermediate frequency quadrature signal component from said radio frequency signal, and said received signal strength indicator for producing a received signal strength indicator signal from said low intermediate frequency in-phase and quadrature signal components, said received signal strength indicator comprising		
a first absolute value former for deriving a first absolute signal from said in-phase signal component,	Fig. 3, 40	Page 6, final paragraph
a second absolute value	Fig. 3, 41	Page 6, final paragraph

former for deriving a second absolute signal from said quadrature signal component, and		
an adder for forming a sum of said first and second absolute signals,	Fig. 3, 42	Page 6, final paragraph
wherein the in-phase signal component and the quadrature signal component contribute to the sum in equal proportion.	Fig. 3	The sum 42 is a "straight sum;" i.e., there is no different weighting of the values being summed.

The following analysis of independent claim 15 is presented for convenience:

Element	Figure(s)	Paragraph(s) and/or page(s)
15. A method of determining a received signal strength indicator signal from an in-phase signal component and a quadrature signal component of a low intermediate frequency signal that represents a received radio frequency signal, said method comprising:		
performing a limiting operation to obtain a limited in-phase signal component and a limited quadrature signal component;	Fig. 2: 30, 31	Page 6, first full paragraph
determining a first absolute value from said limited in-phase signal component;	Fig. 2, 32	Page 6, first full paragraph
determining a second absolute value from said limited quadrature signal component; and	Fig. 2, 33	Page 6, first full paragraph
forming a sum of said first and second absolute values,	Fig. 2, 34	Page 6, first full paragraph
wherein the in-phase signal	Fig. 2	The sum 34 is a "straight

component and the quadrature signal component contribute to the sum in equal proportion.		sum;" i.e., there is no different weighting of the values being summed.

The following analysis of independent claim 20 is presented for convenience:

Element	Figure(s)	Paragraph(s) and/or page(s)
20. A radio device comprising:		
an antenna for receiving a radio frequency signal;	Fig. 1: 9	Page 5, lines 12 and 13
a quadrature down converter for producing a low intermediate frequency in-phase signal component and a low intermediate frequency quadrature signal component from said radio frequency signal;	Fig. 1: 11, 12	Page 5, lines 15-30
a received signal strength indicator for producing a received signal strength indicator signal from said low intermediate frequency in-phase and quadrature signal components, said received signal strength indicator comprising	Fig. 1: 20	Page 5, line 30 to page 6, line 4
a limiter for forming a limited in-phase signal component and a limited quadrature signal component,	Fig. 2: 30, 31	Page 6, first full paragraph
a first absolute value former for deriving a first absolute signal from said limited in-phase signal component,	Fig. 2, 32	Page 6, first full paragraph
a second absolute value former for deriving a second absolute signal from said limited quadrature signal component, and	Fig. 2, 33	Page 6, first full paragraph

an adder for forming a sum of said first and second absolute signals,	Fig. 2, 34	Page 6, first full paragraph
wherein the in-phase signal component and the quadrature signal component contribute to the sum in equal proportion.	Fig. 2	The sum 34 is a "straight sum;" i.e., there is no different weighting of the values being summed.

The following analysis of independent claim 25 is presented for convenience:

Element	Figure(s)	Paragraph(s) and/or page(s)
25. A received signal strength indicator for use in radio device with an antenna for receiving a radio frequency signal, a quadrature down converter for producing a low intermediate frequency in-phase signal component and a low intermediate frequency quadrature signal component from said radio frequency signal, and said received signal strength indicator for producing a received signal strength indicator signal from said low intermediate frequency in-phase and quadrature signal components, said received signal strength indicator comprising		
a limiter for forming a limited in-phase signal component and a limited quadrature signal component,	Fig. 2: 30, 31	Page 6, first full paragraph
a first absolute value former for deriving a first absolute signal from said limited in-phase signal component,	Fig. 2, 32	Page 6, first full paragraph

a second absolute value former for deriving a second absolute signal from said limited quadrature signal component, and	Fig. 2, 33	Page 6, first full paragraph
an adder for forming a sum of said first and second absolute signals,	Fig. 2, 34	Page 6, first full paragraph
wherein the in-phase signal component and the quadrature signal component contribute to the sum in equal proportion.	Fig. 2	The sum 34 is a "straight sum;" i.e., there is no different weighting of the values being summed.

VI. GROUNDS of REJECTION to be REVIEWED ON APPEAL

The issues in the present matter are whether:

1. under 35 USC 112, claims 1, 4-7 and 10-26 are unpatentable by reason of being inadequately supported in the specification.
2. under 35 USC 103, claims 1, 4, 15 and 16 are unpatentable over Gabato in view of Bodtmann.
3. under 35 USC 103, claims 7, 13, 20, 21, and 25 are unpatentable over Gabato in view of Haartsen further in view of Bodtmann.
4. under 35 USC 103, claims 10, 12, 14, 18, 22 and 23 are unpatentable over Gabato in view of Haartsen further in view of Bodtmann and further still in view of Yoshizawa.
5. under 35 USC 103, claims 11, 19, 24 and 26 are unpatentable over Gabato in view of Haartsen further in view of Bodtmann and further still in view of Chamber.
6. under 35 USC 103, claims 5 and 17 are unpatentable over Gabato in view of Bodtmann further in view of Yoshizawa.
7. under 35 USC 103, claim 6 is unpatentable over Gabato in view of Bodtmann further in view of Chamber.

THE OBVIOUSNESS-TYPE DOUBLE PATENTING REJECTION IS NOT APPEALED.

VII. ARGUMENT

I. Rejection of Claims 1, 4-7 and 10-26 as Being Inadequately Supported in the Specification

It is well established that the features of the claim, though they must find support in the specification, need not appear *ipsis verbis* in the specification.

The written description requirement may be satisfied by the specification, the drawing, or both. In Figure 3 of the drawing, it may be seen that the absolute value of the in-phase signal component is taken, the absolute value of the quadrature signal component is taken, and the absolute values are summed. The contributions of the in-phase and quadrature signals to the sum are not weighted (as in Gabato, for example). Rather, the in-phase signal component and the quadrature signal component contribute to the sum in equal proportion. At least Figure 3 and its accompanying description are therefore believed to satisfy the written description requirement.

II. Rejection of Claims 1, 4, 15 and 16 as Unpatentable Over Gabato in View of Bodtmann

Gabato is described in the Background section of the present application (page 1, second full paragraph to page 2, first full paragraph). In Gabato, different scale factors are applied to the in-phase and quadrature components in order to approximate the *square root of the sum of the squares*. Hence, in Gabato, the in-phase and quadrature components contribute to the sum in vastly differing proportions.

Unlike Gabato, in the present invention, the in-phase signal component and the quadrature signal component contribute to the sum used to form the RSSI indication *in*

equal proportion. The Office Action takes the position that, although such a feature is not taught by Gabato, it is taught by Bodtmann in such a way that it would have been obvious to combine the teachings of the references in such a manner as to arrive at the present invention. This is not the case.

Whereas Gabato relates to a received signal strength indicator (RSSI) circuit, Bodtmann relates to something quite different, namely a radio transmitter circuit in which a baseband signal is modulated by two modulators whose outputs are combined in such a way as to eliminate third-order nonlinearities (Abstract). It would therefore not have been obvious to combine the teachings of Bodtmann, relating to a radio ***transmitter***, with those of Gabato, relating to an RSSI circuit used in a radio ***receiver*** in such a way as to arrive at the present invention. The rejections, all of which are based on the combination of Gabato and Bodtmann, are therefore believed to be unsupportable.

III. Rejection of claims 7, 13, 20, 21, and 25 as unpatentable over Gabato in view of Haartsen further in view of Bodtmann

Whereas Gabato relates to a received signal strength indicator (RSSI) circuit, Bodtmann relates to something quite different, namely a radio transmitter circuit in which a baseband signal is modulated by two modulators whose outputs are combined in such a way as to eliminate third-order nonlinearities (Abstract). It would therefore not have been obvious to combine the teachings of Bodtmann, relating to a radio ***transmitter***, with those of Gabato, relating to an RSSI circuit used in a radio ***receiver***, and the further secondary references in such a way as to arrive at the present invention. The rejection, which is

based on the combination of Gabato and Bodtmann, is therefore believed to be unsupportable.

IV. Rejection of claims 10, 12, 14, 18, 22 and 23 as unpatentable over Gabato in view of Haartsen further in view of Bodtmann and further still in view of Yoshizawa

Whereas Gabato relates to a received signal strength indicator (RSSI) circuit, Bodtmann relates to something quite different, namely a radio transmitter circuit in which a baseband signal is modulated by two modulators whose outputs are combined in such a way as to eliminate third-order nonlinearities (Abstract). It would therefore not have been obvious to combine the teachings of Bodtmann, relating to a radio ***transmitter***, with those of Gabato, relating to an RSSI circuit used in a radio ***receiver***, and the further secondary references in such a way as to arrive at the present invention. The rejection, which is based on the combination of Gabato and Bodtmann, is therefore believed to be unsupportable.

V. Rejection of claims 11, 19, 24 and 26 are unpatentable over Gabato in view of Haartsen further in view of Bodtmann and further still in view of Chamber

Whereas Gabato relates to a received signal strength indicator (RSSI) circuit, Bodtmann relates to something quite different, namely a radio transmitter circuit in which a baseband signal is modulated by two modulators whose outputs are combined in such a way as to eliminate third-order nonlinearities (Abstract). It would therefore not have been obvious to combine the teachings of Bodtmann, relating to a radio ***transmitter***, with those of Gabato, relating to an RSSI circuit used in a radio ***receiver***, and the further secondary references in such a way as to arrive at the present invention. The rejection, which is

based on the combination of Gabato and Bodtmann, is therefore believed to be unsupportable.

VI. Rejection of claims 5 and 17 as unpatentable over Gabato in view of Bodtmann further in view of Yoshizawa

Whereas Gabato relates to a received signal strength indicator (RSSI) circuit, Bodtmann relates to something quite different, namely a radio transmitter circuit in which a baseband signal is modulated by two modulators whose outputs are combined in such a way as to eliminate third-order nonlinearities (Abstract). It would therefore not have been obvious to combine the teachings of Bodtmann, relating to a radio ***transmitter***, with those of Gabato, relating to an RSSI circuit used in a radio ***receiver***, and the further secondary references in such a way as to arrive at the present invention. The rejection, which is based on the combination of Gabato and Bodtmann, is therefore believed to be unsupportable.

VII. Rejection of claim 6 as unpatentable over Gabato in view of Bodtmann further in view of Chamber

Whereas Gabato relates to a received signal strength indicator (RSSI) circuit, Bodtmann relates to something quite different, namely a radio transmitter circuit in which a baseband signal is modulated by two modulators whose outputs are combined in such a way as to eliminate third-order nonlinearities (Abstract). It would therefore not have been obvious to combine the teachings of Bodtmann, relating to a radio ***transmitter***, with those of Gabato, relating to an RSSI circuit used in a radio ***receiver***, and the further secondary references in such a way as to arrive at the present invention. The rejection, which is

based on the combination of Gabato and Bodtmann, is therefore believed to be unsupportable.

In view of the above, applicant submits that all of the above referred-to claims are patentable over the teachings of the cited references.

VIII. CONCLUSION

In view of the above analysis, it is respectfully submitted that the referenced teachings, whether taken individually or in combination, fail to anticipate or render obvious the subject matter of any of the present claims. Therefore, reversal of all outstanding grounds of rejection is respectfully solicited.

Date: 2/14/2008

By: Michael Ure
Attorney for Applicant
Registration No. 33,089

IX. APPENDIX: THE CLAIMS ON APPEAL

1. A method of determining a received signal strength indicator signal from an in-phase signal component and a quadrature signal component of a low intermediate frequency signal that represents a received radio frequency signal, said method comprising: determining a first absolute value from said in-phase signal component; determining a second absolute value from said quadrature signal component; and forming a sum of said first and second absolute values, wherein the in-phase signal component and the quadrature signal component contribute to the sum in equal proportion.

2. (Canceled)

3. (Canceled)

4. A method as claimed in claim 1, further comprising logarithmically processing said in-phase and quadrature signal components after summing said first and second absolute values.

5. A method as claimed in claim 1, wherein said received signal strength indicator signal is further determined by low pass filtering said summed first and second absolute values.

6. A method as claimed in claim 1, wherein said low intermediate frequency signal is a zero intermediate frequency signal.

7. A radio device comprising: an antenna for receiving a radio frequency signal; a quadrature down converter for producing a low intermediate frequency in-phase signal component and a low intermediate frequency quadrature signal component from said radio frequency signal; a received signal strength indicator for producing a received signal strength indicator signal from said low intermediate frequency in-phase and quadrature signal components, said received signal strength indicator comprising a first absolute value former for deriving a first absolute signal from said in-phase signal component, a second absolute value former for deriving a second absolute signal from said quadrature signal component, and an adder for forming a sum of said first and second absolute signals, wherein the in-phase signal component and the quadrature signal component contribute to the sum in equal proportion.

8. (Canceled)

9. (Canceled)

10. A radio device as claimed in claim 7, wherein said received signal strength indicator further comprises a low pass filter for low pass filtering said added first and second absolute signals.

11. A radio device as claimed in claim 7, wherein said low intermediate frequency signal is a zero intermediate frequency.

12. A radio device as claimed in claim 7, wherein said received signal strength indicator further comprises a logarithmic signal former for forming a logarithmic signal from said added first and second absolute signals.

13. A received signal strength indicator for use in radio device with an antenna for receiving a radio frequency signal, a quadrature down converter for producing a low intermediate frequency in-phase signal component and a low intermediate frequency quadrature signal component from said radio frequency signal, and said received signal strength indicator for producing a received signal strength indicator signal from said low intermediate frequency in-phase and quadrature signal components, said received signal strength indicator comprising a first absolute value former for deriving a first absolute signal from said in-phase signal component; a second absolute value former for deriving a second absolute signal from said quadrature signal component; and an adder for forming a sum of said first and second absolute signals, wherein the in-phase signal component and the quadrature signal component contribute to the sum in equal proportion.

14. A received signal strength indicator as claimed in claim 13, wherein said low intermediate frequency signal is a zero intermediate frequency signal.

15. A method of determining a received signal strength indicator signal from an in-phase signal component and a quadrature signal component of a low intermediate frequency

signal that represents a received radio frequency signal, said method comprising: performing a limiting operation to obtain a limited in-phase signal component and a limited quadrature signal component; determining a first absolute value from said limited in-phase signal component; determining a second absolute value from said limited quadrature signal component; and forming a sum of said first and second absolute values, wherein the limited in-phase signal component and the limited quadrature signal component contribute to the sum in equal proportion.

16. A method as claimed in claim 15, wherein said limiting operation comprises logarithmically processing said in-phase and quadrature signal components before determining said first and second absolute values.

17. A method as claimed in claim 16, wherein said logarithmically processing comprises multistage limiting of said in-phase and quadrature signal components, and summing said multistage limited in-phase and quadrature signal components.

18. A method as claimed in claim 14, wherein said received signal strength indicator signal is further determined by low pass filtering said summed first and second absolute values.

19. A method as claimed in claim 14, wherein said low intermediate frequency signal is a zero intermediate frequency signal.

20. A radio device comprising: an antenna for receiving a radio frequency signal; a quadrature down converter for producing a low intermediate frequency in-phase signal component and a low intermediate frequency quadrature signal component from said radio frequency signal; a received signal strength indicator for producing a received signal strength indicator signal from said low intermediate frequency in-phase and quadrature signal components, said received signal strength indicator comprising a limiter for forming a limited in-phase signal component and a limited quadrature signal component, a first absolute value former for deriving a first absolute signal from said limited in-phase signal component, a second absolute value former for deriving a second absolute signal from said limited quadrature signal component, and an adder for forming a sum of said first and second absolute signals, wherein the limited in-phase signal component and the limited quadrature signal component contribute to the sum in equal proportion.

21. A radio device as claimed in claim 20, wherein said received signal strength indicator further comprises a first logarithmic signal former for determining a first logarithmic signal from said in-phase signal component and a second logarithmic signal former for determining a second logarithmic signal from said quadrature signal component, said first absolute signal being said first logarithmic signal and said second absolute signal being said second logarithmic signal.

22. A radio device as claimed in claim 21, wherein said first and second logarithmic signal formers comprise respective multistage limiters and respective adders for adding

signals produced by said multistage limiters.

23. A radio device as claimed in claim 20, wherein said received signal strength indicator further comprises a low pass filter for low pass filtering said added first and second absolute signals.

24. A radio device as claimed in claim 20, wherein said low intermediate frequency signal is a zero intermediate frequency.

25. A received signal strength indicator for use in radio device with an antenna for receiving a radio frequency signal, a quadrature down converter for producing a low intermediate frequency in-phase signal component and a low intermediate frequency quadrature signal component from said radio frequency signal, and said received signal strength indicator for producing a received signal strength indicator signal from said low intermediate frequency in-phase and quadrature signal components, said received signal strength indicator comprising a limiter for forming a limited in-phase signal component and a limited quadrature signal component, a first absolute value former for deriving a first absolute signal from said limited in-phase signal component; a second absolute value former for deriving a second absolute signal from said limited quadrature signal component; and an adder for forming a sum of said first and second absolute signals, wherein the limited in-phase signal component and the limited quadrature signal component contribute to the sum in equal proportion.

26. A received signal strength indicator as claimed in claim 25, wherein said low intermediate frequency signal is a zero intermediate frequency signal.

X. APPENDIX: RELATED PROCEEDINGS

NONE

XI. APPENDIX: EVIDENCE

NONE